



Test Facility Helping Solve the Mysteries of Venus

Solar System and Beyond

The Glenn Extreme Environments Rig (GEER) is opening doors to a new field of research. This one-of-a-kind test facility at Plum Brook Station can simulate planetary environments with extremely high temperatures and pressures, and multicomponent chemistry—such as those found on the surface of Venus.

On Venus, there are clouds of sulfuric acid that drizzle corrosive rain; surface temperatures exceeding 900 degrees Fahrenheit, hot enough to melt lead; and an atmospheric pressure 100 times that of Earth. Consequently, there is little data to predict how long materials will survive on Venus' surface.

GEER was created to test hardware and science experiments for proposed missions, which are intended to reveal basic information about the planet. The GEER team has demonstrated the ability to reach and operate at Venus surface conditions for 24 days.

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Right: John Doebne and Leah Nakley load the GEER vessel with samples that will be exposed to the Venus atmosphere.



GRC-2015-C-4138

Photo by Bridget Caswell

Orion Hardware Arrives for Testing

A test version of the Crew Module Adapter for Orion's service module arrived at Plum Brook Station in July. The adapter, built by Lockheed Martin, connects the European Space Agency's (ESA) service module to the Orion crew module. A structural representation of the ESA service module will arrive in October. Both will be tested in Plum Brook Station's Space Power Facility, which will simulate launch and ascent acoustics and mechanical vibrations.



GRC-2015-C-3488

Photo by Chris Lynch

NIAC Advances Glenn Proposal

The agency has selected a Glenn technology proposal for continued study under Phase II of the NASA Innovative Advanced Concepts (NIAC) Program. The program aims to turn science fiction into science fact through the development of pioneering technologies.

Last year, "Titan Submarine: Exploring the Depths of Kraken Mare," submitted by Glenn's Steve Oleson and

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A century of aerospace achievement

What was it like to work here when NASA was NACA? Over the past 5 months, we have shared a few memories of NACA employees still working at the center. Our final profile is Robert Hendricks, who serves in the Propulsion Division, Research and Engineering Directorate. He is also one of Glenn's esteemed Senior Technologists.

Robert Hendricks

Q. How did you begin your career at NACA?

A. After interning summers with North American Aviation and Rocketdyne, I was recruited for NACA's Rocket Branch in 1957. I accepted after graduating from college, prior to my U.S. Air Force commitment. It has been and continues to be a stimulating career.

Q. What do you remember most about the workforce culture of the early years?



Hendricks

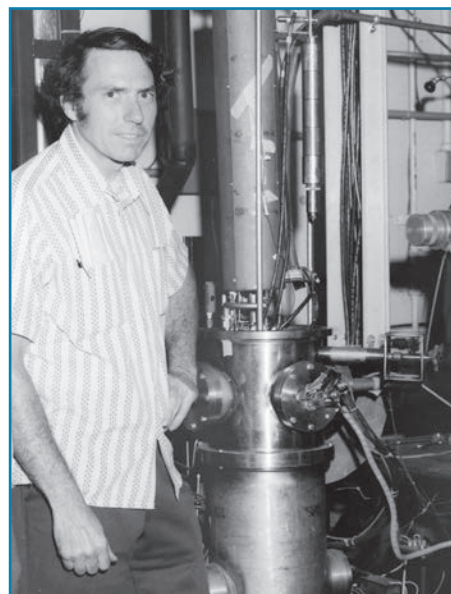
A. Cooperation and open willingness—colleagues could offer their assistance “to-day,” with no delay due to WBS nonsense. We always had great technicians, mechanics and mentors, such as Dr. R.W. Graham. And as for finances, one person handled it all.

Q. As NASA has evolved through the years, what has stayed the same?

A. Despite the bureaucratic, political and fiscal constraints that sometimes reduce initiative, there are still people around here who will support you no matter what. Thank God, because without their assistance, I would have accomplished nothing.

Q. Who stands out among those you have mentored over your career?

A. How does one pick favorites among his kids? I have been blessed with many and have published much with them.



GRC-1976-C-02806

This 1976 photo shows Hendricks (doing what in what facility?)

Q. What do you feel is the most important contribution you have made to NASA's mission?

A. Some may say enabling upper stage propulsion systems, secondary engine systems flows, alternate fueled combustion or alternate energy. It's a most difficult question that only time may resolve.

By S. Jenise Veris

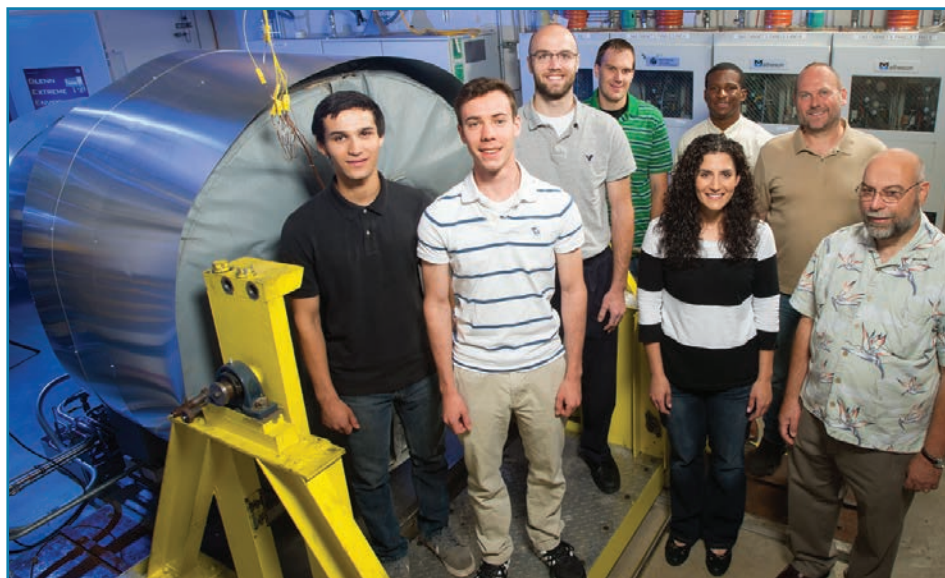
Mysteries of Venus

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During a fellowship at NASA Glenn, Case Western University's professor Ralph Harvey has been working with the GEER team to prepare and conduct a series of tests to determine how Venus surface minerals interact with its atmosphere. “GEER offers an unparalleled capability to simulate this extreme environment,” Harvey said.

Glenn's Extreme Environments Manager Dan Vento, Space Science Project Office, said that word of the incredible 24-cubic-foot chamber is catching on in the scientific community. “We are constantly getting inquiries from potential users inside and outside of NASA,” he said. “GEER will be a very busy place.”

For GEER, the team has been able to leverage Glenn's capabilities in high-temperature materials and electronics



GRC-1976-C-4134

Photo by Bridget Caswell

The GEER team of engineers, technicians and interns, pictured, left to right: A.J. Almy, Austin Flint, J. Michael Newman, Joe Rymut, Leah Nakley, Marcus Tarver, John Doebne and Dan Vento.

and in mitigating high-temperature corrosion. This expertise was developed mainly for the aeronautics

program but has direct applications to operating in a Venus-like environment.

By Doreen B. Zudell